

REMARKS

The specification has been amended to make editorial changes therein.

The indication that claims 7, 9, 13-16 and 18 include patentable subject matter is acknowledged with thanks.

Claims 1-22 were rejected under §112, second paragraph, and have been replaced with new claims that are believed to be proper as to form. Reconsideration and withdrawal of the rejection are respectfully requested.

Claim 23 replaces claim 1 and includes control means which are separated from the control unit of the introduction members, specifically provided for controlling and driving the regulator (this feature can be deduced from the description and from Figure 1, as an example). This new claim also includes a portion of originally-filed claim 2 referring to the positioning of the regulator, which regulator is described in new claim 23 as a pressure regulator, as defined in originally-filed claim 5.

The dependent claims have also been revised, namely claim 24 repeats a portion of originally-filed claim 2 and states that the quantity of the second fuel stoichiometrically equivalent to the quantity of first fuel is introduced in the explosion chambers when the engine is fed with said second fuel. Originally-filed claims 3 and 4 have been renumbered as claims 40-41, whereas originally-filed claims 6-18 relate to claims 25-33 and 36-39.

New claims 34 and 35 have been introduced, their content is apparent from Figure 1 or can be derived from the skill person's knowledge on the basis of this figure.

A new method claim 42 is provided that corresponds to claim 23.

No new matter has been introduced into the claims.

Claims 1-6, 8, 10-12, 17, and 19-22 were rejected as unpatentable over KOCH 5,755,211 in view of GREEN 6,250,260. Reconsideration and withdrawal of the rejection are respectfully requested.

Preliminarily, and to help clarify an understanding of a distinguishing feature of the present invention, note that the last paragraph of claim 1 of KOCH provides that the times for triggering the injection valves are changed when changing the type of fuel: the present invention keeps these times the same. That is, the invention includes a pressure regulator that adjusts the pressure and density of the second fuel so that the change of fuel type is invisible to the control unit that controls the two types of injectors.

The presently claimed invention refers to a feed and control system for an internal combustion engine comprising introduction members for a first fuel and a second fuel controlled by a single control unit, the second fuel being regulated by a pressure regulator in a feeding conduit connected to the second members; this feed and control system is provided

with control means 21 that is different from the control unit and is specifically provided for controlling the pressure regulator in such a manner that the times for introducing the two fuels are equal.

In other words, the invention in the new claims stresses that control means are provided for controlling the pressure regulator to control the regulator member operation so as to feed the second fuel to the engine and regulate its density and pressure, in such a manner that the times for introducing such second fuel into each cylinder are equal to the times for introducing the first fuel.

The invention thus allows to use the control unit of the injectors of the first fuel to also control the injectors of the second fuel without giving the control unit specific information as to the engine operation with the second fuel. In other words, the control unit maintains the activation modalities scheduled for the first injectors under the existing engine utilization conditions (see lines 6-12 on page 17 of this patent application as filed).

Hence, by virtue of the invention, there is no need for the control unit to be set (this unit being designed for operating the engine with the first fuel, and setting would be necessary to operate the engine with the second fuel), thus the setting as made by the manufacturer is maintained thus avoiding any problem connected to its change due to the fact that the

control unit is provided, as an after market, to control an engine also operating with a fuel alternative to the one the engine was designed for. Moreover, it avoids any change of the parameters of the engine operation when it works with the second fuel, which parameters must necessarily be introduced in the control unit in order to allow the control said engine operation with the second fuel if it is desired that the above unit be a single unit for controlling the engine operating alternatively with a first or a second fuel.

According to the invention, control means provided for specifically controlling the pressure regulator depending on data at least connected to the pressure of the second fuel introduced in the corresponding injectors allow to change the quantities of the second fuel fed into such injectors in such a manner that the times for introducing the first fuel into the injectors are equal to the times for introducing the second fuel into the corresponding injectors. That enables the control unit to operate with the same modes pre-selected for engine operation with the first fuel, without "realizing" that the fuel fed has change.

Neither applied reference discloses this feature.

KOCH relates to an apparatus for operating an internal combustion engine having a single electronic control unit that controls the feeding of either the first or the second fuel (gasoline fuel and LPG fuel). Contrary to the present invention,

the fuels are fed in different ignition times (see column 5, lines 19-37).

Therefore, KOCH discloses an apparatus operating in a way which is completely different from the present invention. It is to be added that in the prior art there are described two feeding and injection systems which are separated for each fuel; it is apparent from the description that the LPG fuel is kept liquefied, a pump for feeding the injectors 25 and a check valve 38 on the tank return conduit being provided. This detail is significant as it does not provide a pressure regulator. Indeed, it is hinted that a compressed natural gas might be used, but in this case the apparatus diagram would be completely different from the one described in the prior art as it would surely need a proper pressure regulator, just for citing the more evident difference.

GREEN relates to a control system and assembly for modifying a diesel powered electric generator capable of running on either 100% diesel fuel or in a mixture of methane based gas and diesel. The generator or engine disclosed in this prior art is not therefore of the bi-fuel mode, but a dual-fuel mode. It can use two fuels at the same time while operating (and one fuel chosen between two fuels). The engine is of an induction type. Therefore, the fuel is fed at atmospheric pressure. It cannot be compared to or connected with an engine using fuels at relatively high pressures and modulated.



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In view of the present amendment and the foregoing remarks, it is believed that the present application has been placed in condition for allowance. Reconsideration and allowance are respectfully requested.

Please charge the fee of \$50 for the extra claim of any type added herewith, to Deposit Account No. 25-0120.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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